OVERVIEW OF THE CLIMATE OF THE NEVADA TEST SITE (NTS)

General

The NTS is located in the extreme southwestern corner of the Great Basin. Consequently, the climate is arid with limited precipitation, low humidity, large daily temperature ranges, and intense solar radiation during the summer months.

Precipitation

Two fundamental physical processes drive precipitation events on the NTS: those resulting from cool-season, mid-tropospheric cyclones and those resulting from summertime convection. Cool-season precipitation is usually light and can consist of rain or snow. Summer is thunderstorm season. Precipitation from thunderstorms is usually light; however, some storms are associated with very heavy rain, flash floods, intense cloud-to-ground lightning, and strong surface winds. Thunderstorms generally occur in July and August when moist tropical air can flow northward from the southeastern North Pacific Ocean and spread over the desert southwest. This seasonal event is referred to as the southwestern monsoon.

Mean annual precipitation totals on the NTS range from nearly 13 inches over the high terrain in the northwestern part of the NTS to less than 5 inches in Frenchman Flat. However, inter-annual variations can be great. For example, 9.67 inches fell in Frenchman Flat in 1998 and only 1.14 inches fell in 1989. Precipitation also varies with terrain elevation. On average, annually, only 4.8 inches of precipitation are measured at Well 5B in Area 5, elevation 3,080 ft, while an annual average of 12.82 inches occurs on Rainier Mesa, elevation 7490 ft. Annual totals of less than 1.0 inch have occurred over the lower elevations of the NTS. Daily precipitation totals can also be large and can range from 2.0 to over 3.5 inches. **The greatest daily precipitation event on the NTS was 3.77 inches, which was measured at Rock Valley on September 21, 2007. A storm-total precipitation amount of 3.5 inches is a 100-year, 24-hour, extreme precipitation event.** Two to three-inch daily totals have been measured at several sites on the NTS.

Snow can fall on the NTS anytime between October and May. In Yucca Flat, the greatest daily snow depth measured is 10 inches in January 1974. The greatest daily depth measured at Desert Rock is 6 inches in February 1987. Maximum daily totals of 15 to 20 inches or more can occur on Pahute and Rainier Mesas.

Hail, sleet, freezing rain, and fog are rare on the NTS. Only 24 hail storms were observed in Yucca Flat between 1957 and 1978. Hail and sleet can cover the ground briefly following intense thunderstorms.

Temperature

As is typical of an arid climate; the NTS experiences large daily, as well as annual, ranges in temperature. Moreover, temperatures vary with elevation. Sites 5,000 ft above mean sea level can be quite cold in the winter and fairly mild during the summer months. At lower elevations, summertime temperatures can frequently exceed 100^{o}F. **Consequently, heat stress can be a safety concern for those working outside;** especially during the summer months. On the dry lake beds, daily temperature ranges can vary by 40^{o}F to 60^{o}F with very cold morning temperatures in the winter and very hot temperatures in the summer. In Frenchman Flat, the average daily temperature minimum

and maximum for January is 24°F to 56°F while in July it is 62°F to 102°F. By contrast, on Pahute Mesa the minimum and maximum temperature for January is 25°F to 41°F and for July, 61°F to 84°F. **The highest maximum temperature measured on the NTS is 115°F** in Frenchman Flat, near Well 5B, in July 1998 and in Jackass Flats near the Lathrop Wells Gate, in July 2002. The coldest minimum temperature measured on the NTS is -14°F in Yucca Flat in December1967. The temperature extremes at Mercury are 11°F to 113°F.

Wind

Complex topography, such as that on the NTS, can influence wind speeds and directions. Furthermore, there is a seasonal as well as strong daily periodicity to local wind conditions. For example, in Yucca Flat, during the summer months, the wind direction is usually northerly (from the north) from 10 p.m. PDT to 7 a.m. PDT and southerly from 9 a.m. PDT to 8 p.m. PDT. However, in January the winds are generally from the north from 6 p.m. PST to 11 a.m. PST with some southerly winds developing between 1100 a.m. PST and 5 p.m. PST. March through June tend to experience the fastest average wind speeds (8 to 12 mph) with the faster speeds occurring at the higher elevations. Peak wind gusts of 50 to 70 mph have occurred throughout the NTS. Peak winds at Mercury have been as high as 84 mph during a Spring wind storm. Frenchman Flat experienced wind gusts to 70 mph during the same wind storm. **The peak wind speeds measured on the NTS are above 90 mph on the high terrain with maximums of 91 mph at Yucca Mountain Ridge-top, 92 mph at the Monastery in Area-6, and 94 mph in Area-12 on Radio Hill**.

Relative Humidity

The air over the NTS tends to be dry. On average, June is the driest month with humidity ranging from 10% to 35%. Humidity readings of 35% to 70% are common in the winter. The reason for this variability is that relative humidity is temperature dependent. The relative humidity tends to be higher with cold temperatures and lower with hot temperatures. Consequently there is not only a seasonal variation but also a marked diurnal rhythm with this parameter. Early in the morning the humidity ranges from 25% to 70% and in mid-afternoon it is in the 10% to 40% range, with the larger readings occurring in winter. Humidity readings of more than 75% are rare on the NTS.

Hazardous Weather Phenomena.

Wind speeds in excess of 60 mph occur annually. Additional severe weather in the region includes occasional severe thunderstorms, lightning, hail, and dust storms. Severe thunderstorms may produce high precipitation rates that may create localized flash flooding. Few tornadoes have been observed in the region and are not considered a significant threat.

Cloud-to-ground (CG) lightning can occur throughout the year but primarily between June and September. Maximum CG lightning activity on the NTS occurs between 1 p.m. and 8 p.m. PDT while minimum activity occurs between 8 a.m. and 9 a.m. PDT. **For safety analyses, the mean annual flash density on the NTS is 0.4 fl/sq. km/yr.**

In the dry, clear desert air, the UV component of sunlight can be very intense. **Safety precautions should be taken to protect against sunburn**, especially between April and October.

Extreme meteorological conditions across the NTS are thoroughly documented on the ARL/SORD webpage at < www.sord.nv.doe.gov> under the “Climate” section.